

WE CLAIM:

1. A system adapted to control protection switching in a node of a communications network, the node comprising a multi-stage switch fabric having a first stage including a respective plurality of stage-1 switch elements, the system comprising:

an interface operatively coupled to a set of two or more stage-1 switch elements, the interface being adapted to convey traffic between a plurality of channels of the communications network and the set of stage-1 switch elements; and

a toggle adapted to control the set of stage-1 switch elements to selectively map traffic between a middle stage of the switch fabric and a selected one of a set of any two of the plurality of channels.
2. A system as claimed in claim 1, wherein the first stage comprises one of: an input stage and an output stage of the multi-stage switch fabric.
3. A system as claimed in claim 1, wherein the set of two or more stage-1 switch elements comprises less than all of the stage-1 switch elements of the multi-stage switch fabric.
4. A system as claimed in claim 1, wherein the set of any two of the plurality of channels comprises a working channel and a protection channel of the communications network.

5. A system as claimed in claim 4, wherein the protection channel is provisioned and associated with the working channel in accordance with a design of the communications network.
6. A system as claimed in claim 4, wherein the protection channel is dynamically allocated in response to detection of a network resource failure affecting traffic flow through the working channel.
7. A system as claimed in claim 4, wherein the interface comprises at least two port cards, each port card being adapted to convey traffic between at least two respective channels of the communications network and the set of stage-1 switch elements.
8. A system as claimed in claim 7, wherein traffic is conveyed between each of the working and protection channels, and the set of stage-1 switch elements, by respective first and second port cards of the interface.
9. A system as claimed in claim 1, wherein two or more interfaces are operatively coupled to respective sets of stage-1 switch elements.
10. A system as claimed in claim 9, wherein the respective sets of stage-1 switch elements are non-overlapping.
11. A system as claimed in claim 10, wherein a number of stage-1 switch elements within each set is the same.

12. A system as claimed in claim 7, wherein the multi-layer switch fabric comprises a plurality of parallel switch cards having a respective plurality of layer-1 switch elements.
13. A system as claimed in claim 12, wherein the set of stage-1 switch elements comprises a corresponding set of two or more stage-1 switch elements of each one of the plurality of parallel switch cards.
14. A system as claimed in claim 1, wherein the toggle comprises:
 - a pointer having respective working and protection states corresponding to each one of the working channel and the protection channel, the set of stage-1 switch elements being adapted to map traffic between the middle stage of the switch fabric and one of the working channel and the protection channel in accordance with the state of the pointer; and
 - a controller adapted to select a state of the pointer.
15. A system as claimed in claim 14, wherein the controller is adapted to:
 - select the protection state of the pointer such that traffic is mapped between the middle stage of the switch fabric and the protection channel, when a network resource failure affecting the working channel is detected; and

select the working state of the pointer such that traffic is mapped between the middle stage of the switch fabric and the working channel, otherwise.

16. A network node adapted to switch traffic between associated working and protection channels of a communications network, the node comprising:

a multi-stage switch fabric comprising a first stage including a respective plurality of stage-1 switch elements;

an interface operatively coupled to a set of two or more stage-1 switch elements, the interface being adapted to convey traffic between a plurality of channels of the communications network and the set of stage-1 switch elements; and

a toggle adapted to control the set of stage-1 switch elements to selectively map traffic between a middle stage of the switch fabric and a selected one of a set of any two of the plurality of channels.

17. A node as claimed in claim 16, wherein the first stage comprises one of: an input stage and an output stage of the multi-stage switch fabric.
18. A node as claimed in claim 16, wherein the set of two or more stage-1 switch elements comprises less than all of the stage-1 switch elements of the multi-stage switch fabric.
19. A node as claimed in claim 16, wherein the set of any two of the plurality of channels comprises a working

channel and a protection channel of the communications network.

20. A node as claimed in claim 19, wherein the protection channel is provisioned and associated with the working channel in accordance with a design of the communications network.
21. A node as claimed in claim 19, wherein the protection channel is dynamically allocated in response to detection of a network resource failure affecting traffic flow through the working channel.
22. A node as claimed in claim 19, wherein the interface comprises at least two port cards, each port card being adapted to convey traffic between at least two respective channels of the communications network and the set of stage-1 switch elements.
23. A node as claimed in claim 22, wherein traffic is conveyed between each of the working and protection channels, and the set of stage-1 switch elements, by respective first and second port cards of the interface.
24. A node as claimed in claim 16, wherein two or more interfaces are operatively coupled to respective sets of stage-1 switch elements.
25. A node as claimed in claim 24, wherein the respective sets of stage-1 switch elements are non-overlapping.
26. A node as claimed in claim 25, wherein a number of stage-1 switch elements within each set is the same.

27. A node as claimed in claim 16, wherein the multi-layer switch fabric comprises a plurality of parallel switch cards having a respective plurality of layer-1 switch elements.
28. A node as claimed in claim 27, wherein the set of layer-1 switch elements comprises a corresponding set of layer-1 switch elements of each one of the plurality of parallel switch cards.
29. A node as claimed in claim 28, wherein the selected stage-1 switch element comprises a corresponding one switch element of each one of the plurality of parallel switch cards.
30. A node as claimed in claim 16, wherein the toggle comprises:
- a pointer having respective working and protection states corresponding to each one of the working channel and the protection channel, the set of stage-1 switch elements being adapted to map traffic between the middle stage of the switch fabric and one of the working channel and the protection channel in accordance with the state of the pointer; and
 - a controller adapted to select a state of the pointer.
31. A node as claimed in claim 30, wherein the controller is adapted to:
- select the protection state of the pointer such that traffic is mapped between the middle stage of the switch fabric and the protection channel, when a

network resource failure affecting the working channel is detected; and

select the working state of the pointer such that traffic is mapped between the middle stage of the switch fabric and the working channel, otherwise.

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network resource failure affecting the working channel is detected; and
select the working state of the pointer such that traffic is mapped between the middle stage of the switch fabric and the working channel, otherwise.